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TITLE: CYLINDRICAL SECONDARY BATTERY

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ABSTRACT:

PROBLEM TO BE SOLVED: To reduce a waste space inside of a battery, and while

to lower the electric resistance by forming a positive electrode collector terminal or a negative electrode collector terminal as a bottom plate of a battery jar can, and welding it to an end surface or the inner periphery of an end of the battery jar can.

SOLUTION: A cylindrical secondary battery 1 is formed by inserting an electrode assembly, which is formed by spirally winding the electrolyte, a positive electrode plate 7 and a negative electrode plate 8 through a separator 9, into a cylindrical battery jar can 2, and thereafter, a positive electrode collector terminal and a negative electrode collector terminal 5 are respectively welded to an upper and a lower surfaces of the electrode assembly,

and a sealing plate provided with a safety valve is caulked for fixation through a packing. This terminal 5 is made of nickel, and used as a bottom plate of the can 2, and welded to an end surface 2a of the terminal. Consequently, the can 2 and the terminal 5 are integrally formed with each other by welding, and electric resistance is hard to be generated. An axis hole of the center is formed at a dimension required for winding of the electrode assembly, and the waste of space can be eliminated.

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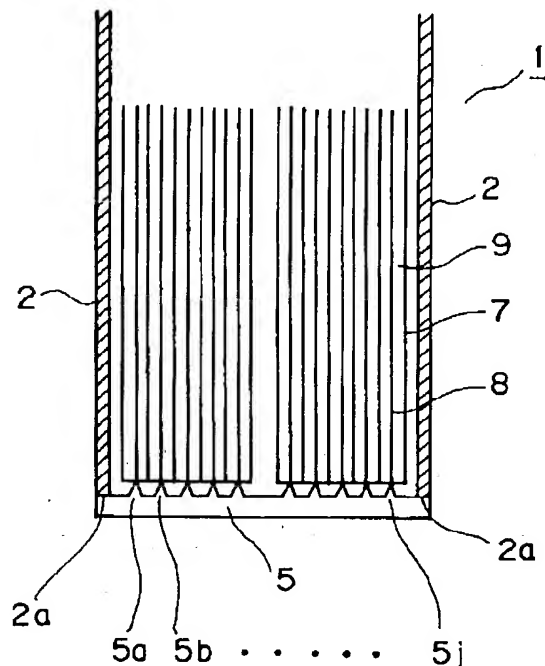
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(54) 【発明の名称】 円筒型二次電池

(57) 【要約】

【課題】 本発明は円筒型二次電池の集電体の構造に関し、特に電池内に無駄なスペースを増やすことなく、電池の電気抵抗を小さくする円筒型二次電池を提供することである。

【解決手段】 円筒型二次電池の負極集電端子5を電池の底板で形成し、電池の負極板8と、上記負極集電端子5に形成した突起間を溶接することで、従来行っていた負極集電端子と電槽缶との間のスポット溶接をなくし、電池の電気抵抗を小さくすると共に、軸孔を小さく形成できるものである。



【特許請求の範囲】

【請求項1】 正電極板と負電極板をセパレータを介して渦巻き状に巻回して形成された電極集合体を、電解液とともに円筒状の電槽缶に収納し、前記正電極板の上端あるいは下端に正極集電端子を接続すると共に、前記負電極板の下端あるいは上端に負極集電端子を接続した円筒型二次電池において、

前記正極集電端子あるいは前記負極集電端子が前記電槽缶の底板であることを特徴とする円筒型二次電池。

【請求項2】 前記正極集電端子あるいは負極集電端子は、前記電槽缶の端部の端面に溶接されていることを特徴とする請求項1記載の円筒型二次電池。

【請求項3】 前記正極集電端子あるいは負極集電端子は、前記電槽缶の端部の内周に溶接されていることを特徴とする請求項1記載の円筒型二次電池。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、円筒型二次電池の構造に関し、特に電極板中の電荷を集電するための集電端子の構造に関する。

【0002】

【従来の技術】近年、電気自動車や電動式フォークリフトの電源として、アルカリ蓄電池の需要が高まっている。特に、アルカリ蓄電池の中でも水素吸蔵合金電極を負極とするニッケル-水素二次電池は、そのエネルギー容量が大きく、上記電気自動車や電動式フォークリフトの電源として注目を集めている。また、ニッケル-水素二次電池は、その形状により、円筒型、角型、等に分類される。これらのなかで円筒型は、乾電池と互換サイズとすることで、様々な機器に幅広く使用することができるといふ利点を備えている。

【0003】図5は従来の円筒型二次電池の断面図である。但し、同図において円筒型二次電池の上部は省略している。同図に示すように、円筒型二次電池10は円筒状の電槽缶（ケース）11内に、正電極板12、負電極板13、及びセパレータからなる電極集合体14を収納して構成され、電槽缶11内には電解液が封入されている。また、電槽缶11の上部には正電極板12が接続する不図示の正極集電端子が配設され、電槽缶11の下部には負電極板13が接続する負極集電端子15が配設されている。

【0004】この負極集電端子15は円形の板状部材であり、その中央に平らな溶接部15aが形成され、この溶接部15aを除く板状部材の上面には複数本の突起15bが形成されている。負電極板13とこの負極集電端子15の電気的接続は、この突起15bを介して行われている。すなわち、この突起15bと負電極板13を溶接により接続している。また、電槽缶11は円筒型二次電池10の負極を構成し、負電極板13に発生した負電荷は負極集電端子15を通して電槽缶11の底板11a

に供給される。

【0005】また、電槽缶11の底板11aと負極集電端子15間の電気的接続は溶接によって行われている。この溶接の方法は、電極集合体14の中心にある軸孔16を通して上述の溶接部15aに不図示の棒状電極を当て、この溶接部15a直下の底板11aの下面に対向電極を当て、両電極間に電流を流すことで溶接部15aを底板11aにスポット溶接している。

【0006】

【発明が解決しようとする課題】上記従来の円筒型二次電池では以下の問題がある。

(イ) 上述のように、電槽缶11（底板11a）と負極集電端子15間の接続はスポット溶接であり接続面積が小さく、底板11aと負極集電端子15間の電気抵抗が大きい。そこで溶接面積を広くするには太い棒電極を使用する必要があるが、上述の軸孔16も対応して広くなり、電池内に無駄なスペースが増える。

(ロ) また、電槽缶11（底板11a）と負極集電端子15をある一点で溶接することは、電気抵抗が大きくなる原因である。

【0007】本発明は、上記問題に鑑みてなされたものであり、電池内に無駄なスペースを増やすことなく、電池の電気抵抗を小さくする円筒型二次電池を提供するものである。

【0008】

【課題を解決するための手段】請求項1記載の発明は上記課題を解決するため、正電極板と負電極板をセパレータを介して渦巻き状に巻回して形成された電極集合体を、電解液とともに円筒状の電槽缶に収納し、前記正電極板の上端あるいは下端に正極集電端子を接続すると共に、前記負電極板の下端あるいは上端に負極集電端子を接続した円筒型二次電池において、前記正極集電端子あるいは前記負極集電端子が前記電槽缶の底板である円筒型二次電池を提供することで達成できる。

【0009】すなわち、正極集電端子あるいは負極集電端子を円筒型二次電池の底板で形成することで、従来必要であった集電端子と底板間のスポット溶接をなくし、円筒型二次電池の電気抵抗を小さくすると共に、軸孔を小さく形成できる。

【0010】また、請求項2記載の発明は、例えば前記正極集電端子あるいは負極集電端子が電槽缶の端部の端面に溶接される構成である。また、請求項3記載の発明は、例えば例えば前記正極集電端子あるいは負極集電端子が電槽缶の端部の内周に溶接される構成である。

【0011】上記請求項2又は3記載のように構成することによっても、正極集電端子あるいは負極集電端子は電槽缶の端部の端面全体、又は内周面全体で溶接され、電池の電気抵抗を小さくすることができる。

【0012】

【発明の実施の形態】以下、本発明による実施の形態に

ついて図面を参照して詳細に説明する。図1は、本実施の形態による円筒型二次電池の全体図である。同図において、円筒型二次電池1は、円筒状の形状をした電槽缶2内に、電解液（電解質）、電極集合体3を挿入した後、この電極集合体3の上面に正極集電端子4を接続（溶接）し、下面に負極集電端子5を接続（溶接）し、安全弁を備えた封口板6をパッキングを介してかして固定している。

【0013】電極集合体3は、同図に示すように正電極板7と負電極板8を交互に巻装し、正電極板7と負電極板8間にセパレータ9を介装して構成されている。また、正電極板7と負電極板8は所定幅上下にずらして重ね合わせ、渦巻き状に巻かれた構成である。尚、この正電極板7は、例えばニッケル酸化物で形成され、負電極板8は水素吸蔵合金で形成されている。また、セパレータ9は、例えば合成樹脂で形成されている。

【0014】一方、図2は上述の円筒型二次電池1の断面図であり、電池の上部を省略した断面図である。同図に示すように、円筒型二次電池1の負極集電端子5は電槽缶2の底板でもある。すなわち、負極集電端子5は電槽缶2の底板として兼用する構造である。電極集合体3は、上述のように正電極板7と負電極板8等で構成され、負電極板8の下端が負極集電端子（底板）5と接続する。

【0015】図3は負極集電端子5の斜視図であり、円形の板状部材の上面に10本の突起5a～5jが形成されている。また、電槽缶2内に電解液としてアルカリ溶液が使用されるため、この負極集電端子5はニッケルで形成されている。そして、この突起5a～5jと負電極板8の下端が溶接されている。尚、この溶接は負極集電端子5に設けられた突起5a～5jが全ての溶接位置で確実に接続するよう、例えば位置を変えて複数回溶接を行う。

【0016】また、負極集電端子5は電槽缶2の端部の端面2aに溶接されている。電槽缶2は円筒状であり、その端面2aは円形となり、一定の幅を有する。すなわち、負極集電端子5は電槽缶2の端面と一周に渡って溶接され、しかも一定の幅を有して溶接される。したがって、電槽缶2と負極集電端子5は溶接部を介して一体構造であり、電気抵抗は殆どない。

【0017】以上のように構成した円筒型二次電池1によれば、電流の流れは電槽缶2→負極集電端子5→負電極板8となり、この時電槽缶2と負極集電端子5間には殆ど電気抵抗がないことから電力の損出が小さい。すなわち、負極集電端子5と負電極板8間の接続抵抗のみとなり、電力浪費を抑えることができる。また、従来例で説明したスポット溶接を行うことがないので、軸孔を電極集合体3の巻き取り時に必要なだけの広さとするべく、無駄なスペースをなくし、円筒型二次電池1を小型化することもできる。

【0018】さらに、本実施の形態は従来例と比較して、負極集電端子5と負電極板8の電氣的接続が均一化し、接続抵抗を小さくし、電流分布の偏りを大幅に改善することができる。したがって、電解液中の活物質が各電極板7及び8全体で反応するようになり、その結果、反応抵抗が減少するため、出力密度が向上する。また、活物質の利用率が向上することから、エネルギー密度、電池容量等を向上させることができる。

【0019】次に、本発明の他の実施形態の例について説明する。図4は、他の実施形態を説明する図であり、円筒型二次電池の要部断面図である。本実施形態の例においても負極集電端子5'は電槽缶2の底板を構成する。また、特に図示しない他の構成、例えば正電極板や負電極板等の構成は前述の実施形態の例と同じである。

【0020】本実施形態の例が上述の例と異なる構成は、図4に○印で示すように、負極集電端子5'が電槽缶2の端部の内周2bに溶接される構成である。この場合でも、電槽缶2は円筒状であり、しかも一定の幅を有して溶接できる。すなわち、電槽缶2と負極集電端子5'はこの溶接部を介して一体構造であり、電気抵抗は殆どない。

【0021】したがって、このように構成した円筒型二次電池によれば、電流の流れは前述の例と同様、電槽缶2→負極集電端子5'→負電極板8となり、この時電槽缶2と負極集電端子5'間には殆ど電気抵抗がなく、負極集電端子5'と負電極板8間の接続抵抗のみであり、電力浪費を小さく抑えることができる。また、本例もスポット溶接が不要であり、軸孔を広くする必要がなく、電池を小型化することが可能である。

【0022】また、本実施の形態の場合も、従来例と比較して電流分布の偏りを大幅に改善し、物質の利用率が向上することから、エネルギー密度、電池容量等を向上させることができる。

【0023】尚、本発明を適用できる円筒型電池としては、ニッケル・水素蓄電池だけではなく、ニッケル・カドミウム蓄電池やリチウムイオン二次電池といった他の種類の二次電池に対しても幅広く適用することができる。

【0024】また、上述の実施形態の例では負極集電端子5、又は5'に形成する突起は10本の突起で形成したが、この本数に限らず、また直線状の突起でなくても良い。

【0025】また、上述の実施形態の例では、底板と負極集電端子とを兼用したが、底板と正極集電端子とを兼用する構成としてもよい。

【0026】

【発明の効果】以上説明したように、本発明は正極集電端子あるいは負極集電端子を電槽缶の底板と兼用するものであり、接続抵抗の小さい円筒型二次電池を提供できる。

【0027】また、スポット溶接を省略できるので軸孔を小さく構成でき、電池を小型化することができる。

【図面の簡単な説明】

【図1】一実施形態による円筒型二次電池の全体図である。

【図2】一本実施形態による円筒型二次電池の要部断面図である。

【図3】負極集電端子の斜視図である。

【図4】他の実施形態による円筒型二次電池の要部断面図である。

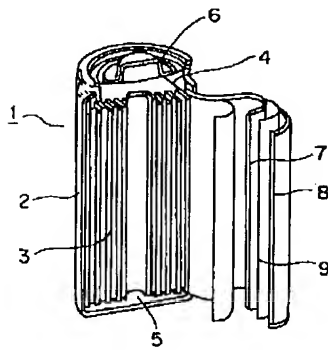
【図5】従来の円筒型二次電池の一部を示す断面図であ

る。

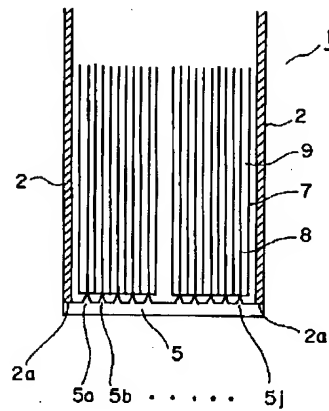
【符号の説明】

- 1 円筒型二次電池
- 2 電槽缶
- 3 電極集合体
- 4 正極集電体
- 5、5' 負極集電端子
- 5a～5j 突起
- 7 正電極板
- 8 負電極板
- 9 セパレータ

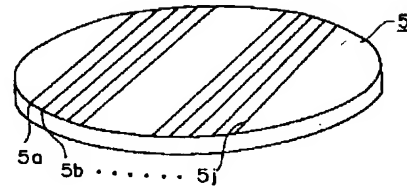
【図1】



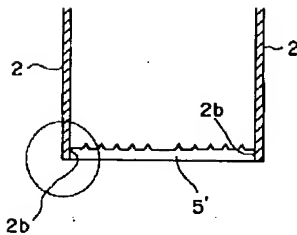
【図2】



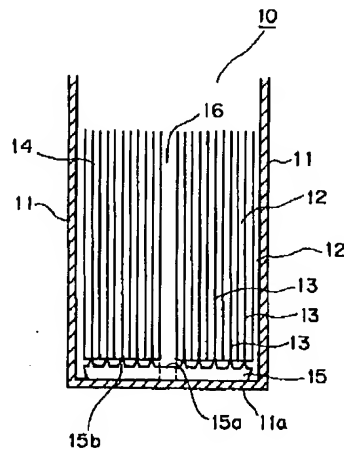
【図3】



【図4】



【図5】



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CLAIMS

[Claim(s)]

[Claim 1] The cylindrical rechargeable battery characterized by said positive-electrode current collection terminal or said negative-electrode current collection terminal being the bottom plate of said ***** in the cylindrical rechargeable battery which connected the negative-electrode current collection terminal to the lower limit or upper limit of said negative electrode plate while containing the electrode assembly which wound the positive electrode plate and the negative electrode plate around the curled form through the separator, and was formed to cylinder-like ***** with the electrolytic solution and connecting a positive-electrode current collection terminal to the upper limit or lower limit of said positive electrode plate.

[Claim 2] Said positive-electrode current collection terminal or a negative-electrode current collection terminal is a cylindrical rechargeable battery according to claim 1 characterized by being welded to the end face of the edge of said *****.

[Claim 3] Said positive-electrode current collection terminal or a negative-electrode current collection terminal is a cylindrical rechargeable battery according to claim 1 characterized by being welded to the inner circumference of the edge of said *****.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the structure of the current collection terminal for collecting the charge in an electrode plate about the structure of a cylindrical rechargeable battery.

[0002]

[Description of the Prior Art] In recent years, the need of an alkaline battery is increasing as a power source of an electric vehicle or an electromotive fork lift truck. The energy capacity of especially the nickel hydrogen rechargeable battery that uses a hydrogen storing metal alloy electrode as a negative electrode also in an alkaline battery is large, and it attracts attention as a power source of the above-mentioned electric vehicle or an electromotive fork lift truck. Moreover, a nickel hydrogen rechargeable battery is classified into cylindrical, a square shape, etc. according to the configuration. Cylindrical is equipped with the advantage that it can be broadly used for various devices by considering as a dry cell and compatible size, in these.

[0003] Drawing 5 is the sectional view of the conventional cylindrical rechargeable battery. However, the upper part of a cylindrical rechargeable battery is omitted in this drawing. As shown in this drawing, in cylinder-like ***** (case) 11, the cylindrical rechargeable battery 10 contains the positive electrode plate 12, the negative electrode plate 13, and the electrode assembly 14 that consists of a separator, and is constituted, and the electrolytic solution is enclosed in ***** 11. Moreover, the non-illustrated positive-electrode current collection terminal which the positive electrode plate 12 connects is arranged in the upper part of ***** 11, and the negative-electrode current collection terminal 15 which the negative electrode plate 13 connects is arranged by the lower part of ***** 11.

[0004] This negative-electrode current collection terminal 15 is circular plate-like part material, even weld zone 15a is formed in that center, and projection of two or more 15b is formed in the top face of the plate-like part material except this weld zone 15a. Electrical installation of the negative electrode plate 13 and this negative-electrode current collection terminal 15 is performed through this projection 15b. That is, the negative electrode plate 13 is connected with this projection 15b by welding. Moreover, ***** 11 constitutes the negative electrode of the cylindrical rechargeable battery 10, and the negative charge generated to the negative electrode plate 13 is supplied to bottom plate 11a of ***** 11 through the negative-electrode current collection terminal 15.

[0005] Moreover, bottom plate 11a of ***** 11 and electrical installation between the negative-electrode current collection terminals 15 are performed by welding. The approach of this welding applies a non-illustrated cylindrical electrode to above-mentioned weld zone 15a through the boss 16 which exists at the core of an electrode assembly 14, a counterelectrode is applied to the inferior surface of tongue of this bottom plate 11a of a weld zone 15a directly under, and spot welding of the weld zone 15a is carried out to bottom plate 11a by passing a current between two electrodes.

[0006]

[Problem(s) to be Solved by the Invention] There are the following problems in the above-mentioned conventional cylindrical rechargeable battery.

(b) As mentioned above, the connection between ***** 11 (bottom plate 11a) and the negative-electrode current collection terminal 15 is spot welding, its connection area is small, and its electric resistance between bottom plate 11a and the negative-electrode current collection terminal 15 is large. Then, although it is necessary to use a thick pin electrode for making welding area large, the above-mentioned boss 16 also corresponds, it becomes large, and useless tooth spaces increase in number in a cell.

(b) Moreover, welding ***** 11 (bottom plate 11a) and the negative-electrode current collection terminal 15 by one certain point is the cause by which electric resistance becomes large.

[0007] This invention offers the cylindrical rechargeable battery which makes the electric resistance of a cell small, without being made in view of the above-mentioned problem, and increasing a useless tooth space in a cell.

[0008]

[Means for Solving the Problem] In order that invention according to claim 1 may solve the above-mentioned technical problem, the electrode assembly which wound the positive electrode plate and the negative electrode plate around the curled form through the separator, and was formed While containing to cylinder-like ***** with an electrolyte and connecting a positive-electrode current collection terminal to the upper limit or lower limit of said positive electrode plate In the cylindrical rechargeable battery which connected the negative-electrode current collection terminal to the lower limit or upper limit of said negative electrode plate, it can attain by offering the cylindrical rechargeable battery said positive-electrode current collection terminal or said whose negative-electrode current collection terminal is the bottom plate of said *****.

[0009] That is, while losing the spot welding between the current collection terminal which was the need conventionally, and a bottom plate and making the electric resistance of a cylindrical rechargeable battery small by forming a positive-electrode current collection terminal or a negative-electrode current collection terminal by the bottom plate of a cylindrical rechargeable battery, a boss can be formed small.

[0010] Moreover, invention according to claim 2 is the configuration that said positive-electrode current collection terminal or a negative-electrode current collection terminal is welded to the end face of the edge of *****, for example. Moreover, invention according to claim 3 is the configuration that said positive-electrode current collection terminal or a negative-electrode current collection terminal is welded to the inner circumference of the edge of *****, for example.

[0011] Also by constituting like above-mentioned claim 2 or 3 publications, a positive-electrode current collection terminal or a negative-electrode current collection terminal is welded by the whole whole end face or the inner skin of an edge of *****, and can make the electric resistance of a cell small.

[0012]

[Embodiment of the Invention] Hereafter, the gestalt of operation by this invention is explained to a detail with reference to a drawing. Drawing 1 is the general drawing of the cylindrical rechargeable battery by the gestalt of this operation. the obturation plate 6 which it connected the positive-electrode current collection terminal 4 to the top face of this electrode assembly 3 (welding), and connected the negative-electrode current collection terminal 5 to the inferior surface of tongue in this drawing after the cylindrical rechargeable battery 1 inserted the electrolytic solution (electrolyte) and an electrode assembly 3 into ***** 2 which carried out the cylinder-like configuration (welding), and was equipped with the relief valve -- packing -- minding -- it is fixing in total.

[0013] An electrode assembly 3 loops around the positive electrode plate 7 and the negative electrode plate 8 by turns, as shown in this drawing, infixes a separator 9 between the positive electrode plate 7 and the negative electrode plate 8, and is constituted. Moreover, the positive electrode plate 7 and the negative electrode plate 8 are the configurations which shifted to the predetermined width-of-face upper and lower sides, and were wound around superposition and a curled form. In addition, this positive electrode plate 7 is formed with a nickel oxide, and the negative electrode plate 8 is formed with the hydrogen storing metal alloy. Moreover, the separator 9 is formed with synthetic resin.

[0014] On the other hand, drawing 2 is the sectional view of the above-mentioned cylindrical rechargeable battery 1, and is the sectional view which omitted the upper part of a cell. As shown in this drawing, the negative-electrode charge collector 5 of the cylindrical rechargeable battery 1 is also the bottom plate of ***** 2. That is, the negative-electrode current collection terminal 5 is structure made to serve a double purpose as a bottom plate of ***** 2. An electrode assembly 3 consists of a positive electrode plate 7 and negative electrode plate 8 grade as mentioned above, and the lower limit of the negative electrode plate 8 connects it with the negative-electrode current collection terminal (bottom plate) 5.

[0015] Drawing 3 is the perspective view of the negative-electrode current collection terminal 5, and the projections 5a-5j of ten are formed in the top face of circular plate-like part material. Moreover, since an alkali solution is used as the electrolytic solution in ***** 2, this negative-electrode current collection terminal 5 is formed with nickel. And the lower limit of these projections 5a-5j and the negative electrode plate 8 is welded. In addition, this welding changes a location and performs multiple-times welding so that the projections 5a-5j prepared in the negative-electrode current collection terminal 5 may connect certainly in all welding locations.

[0016] Moreover, the negative-electrode current collection terminal 5 is welded to end-face 2a of the edge of ***** 2. ***** 2 is cylindrical, and the end-face 2a becomes circular, and it has fixed width of face. That is, the negative-electrode current collection terminal 5 is welded over the end face of ***** 2, and a round, moreover, has fixed width of face and is welded. Therefore, through a weld zone, ***** 2 and the negative-electrode current collection terminal 5 are integral construction, and do not almost have electric resistance.

[0017] According to the cylindrical rechargeable battery 1 constituted as mentioned above, since it becomes the ***** 2 -> negative-electrode current collection terminal 5 -> negative electrode plate 8 and there is almost no electric resistance between ***** 2 and the negative-electrode current collection terminal 5 at this time, the flow of a current has small ***** of power. That is, it becomes only the connection resistance between the negative-electrode current

collection terminal 5 and the negative electrode plate 8, and power waste can be held down. Moreover, since spot welding explained in the conventional example is not performed, the size, then the good and useless tooth space which are required in a boss at the time of rolling up of an electrode assembly 3 can be lost, and the cylindrical rechargeable battery 1 can also be miniaturized.

[0018] Furthermore, as compared with the conventional example, the electrical installation of the negative-electrode current collection terminal 5 and the negative electrode plate 8 can equalize, and the gestalt of this operation can make connection resistance small, and can improve the bias of current distribution sharply. Therefore, in order that the active material in the electrolytic solution may come to react by each electrode plate 7 and the 8 whole, consequently reaction resistance may decrease, power density improves. Moreover, since the utilization factor of an active material improves, energy density, cell capacity, etc. can be raised.

[0019] Next, the example of other operation gestalten of this invention is explained. Drawing 4 is drawing explaining other operation gestalten, and is the important section sectional view of a cylindrical rechargeable battery. Also in the example of this operation gestalt, negative-electrode current collection terminal 5' constitutes the bottom plate of ***** 2. Moreover, it is the same as the example of the above-mentioned operation gestalt, especially other configurations which are not illustrated, for example, the configuration of a positive electrode plate, a negative electrode plate, etc.

[0020] The configuration with which the example of this operation gestalt differs from an above-mentioned example is a configuration that negative-electrode current collection terminal 5' is welded to inner circumference 2b of the edge of ***** 2, as O mark shows to drawing 4. Even in this case, ***** 2 is cylindrical, and, moreover, can have and weld fixed width of face. That is, ***** 2 and negative-electrode current collection terminal 5' are integral construction through this weld zone, and there is almost no electric resistance.

[0021] therefore -- according to the cylindrical rechargeable battery constituted in this way -- the example of the above-mentioned [the flow of a current] -- the same -- the ***** 2 -> negative-electrode current collection terminal 5' -> negative electrode plate 8 -- becoming -- this time -- ***** 2 and negative-electrode current collection terminal 5' -- in between, there is almost no electric resistance, it is only connection resistance between negative-electrode current collection terminal 5' and the negative electrode plate 8, and power waste can be held down small. Moreover, it is not necessary to make a boss large, and this example also has unnecessary spot welding and can miniaturize a cell.

[0022] Moreover, since the bias of current distribution is sharply improved as compared with the conventional example also in the gestalt of this operation and its utilization factor of the matter improves, energy density, cell capacity, etc. can be raised.

[0023] In addition, as a cylindrical cell which can apply this invention, it is broadly applicable also to the rechargeable battery of other classes, such as nickel and not only a hydrogen battery but a nickel cadmium battery, and a rechargeable lithium-ion battery.

[0024] Moreover, not only this number but you may not be a straight-line-like projection although the projection formed in the negative-electrode current collection terminal 5 or 5' was formed by the projection of ten in the example of an above-mentioned operation gestalt.

[0025] Moreover, although the bottom plate and the negative-electrode current collection terminal were made to serve a double purpose in the example of an above-mentioned operation gestalt, it is good also as a configuration combining and a positive-electrode current collection terminal.

[0026]

[Effect of the Invention] As explained above, this invention uses a positive-electrode current collection terminal or a negative-electrode current collection terminal also [bottom plate / of *****], and can offer the small cylindrical rechargeable battery of connection resistance.

[0027] Moreover, since spot welding is omissible, a boss can be constituted small, and a cell can be miniaturized.

[Translation done.]